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August 4, 1951

SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE



Blood Separator

See Page 67

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Girls

RICE

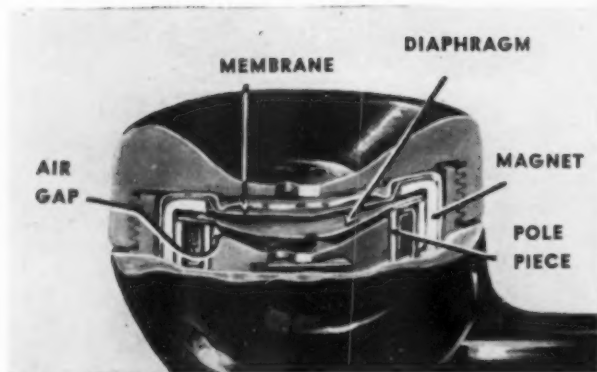
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Easy on
the ear



More naturally than ever, your voice comes to the ear that listens through the latest telephone receiver developed at Bell Telephone Laboratories. The reason: a new kind of diaphragm, a stiff but light plastic. Driven from its edge by a magnetic-metal ring, the diaphragm moves like a piston, producing sound over all of its area. Effective as are earlier diaphragms of magnetic-alloy sheet, the new

one is better, gives more of the higher tones which add that personal touch to your voice.

To work the new receiver, telephone lines need deliver only one-third as much power. So finer wires can do the job. This is another new and important example of the way scientists at Bell Telephone Laboratories work to keep down the cost of telephone service, while the quality goes up.

BELL TELEPHONE LABORATORIES

WORKING CONTINUALLY TO KEEP YOUR TELEPHONE SERVICE ONE OF TODAY'S GREATEST VALUES



MEDICINE

Blood Processed Quickly

Almost instantaneous separation method uses continuous sterile centrifugation. Plasma and cells separated before donor leaves cot.

See Front Cover

► **BLOOD DONATED** to the American Red Cross for our fighting men or to hospital blood banks can be separated into plasma and red blood cells almost instantaneously by a new processing device announced recently.

Actually the plasma and cells are separated before the donor has gotten off the cot or table where he lay while giving the blood. And the quick separation is done in a way that keeps the blood sterile, or free from outside germs.

The saving in time is expected to make more quantities of blood fractions available in pure state. More and better blood medicines for various diseases may then become available because scientists will have more of these pure fractions for research into possible uses. Theoretically, it should also be possible to store red blood cells for longer than the present 21-day limit, because the quick separation will protect them from enzymes and other chemicals in blood plasma which now are believed to cause the breakdown of the red cells.

The new blood separating device was designed by Charles A. Ellis, engineer of the American Optical Company. The need for such a device was first suggested by Dr. Edwin J. Cohn of Harvard, and Mr. Ellis worked in close collaboration with Dr. Cohn in designing and building the blood fractionator.

So far, only a pilot model has been built. It is now in Lisbon, Portugal, where Dr. Cohn will demonstrate it at the International Blood Transfusion Conference. It will be used as the model for a future production series, though these are not expected to be available before next year.

This pilot model is shown in the photograph on the cover of this week's *SCIENCE NEWS LETTER*. A series of trial tests with the device were made at the Bussey Institution of Harvard University before the equipment was shipped to Lisbon.

The device works on the principle of continuous sterile centrifugation. Blood from the donor as it is drawn passes through a tube where calcium is removed and clotting prevented.

It is then cooled and goes into a spinning glass bowl shaped something like an upside down fish bowl with flattened top. The flattened top provides a shelf on which the red cells are caught while the plasma runs down the sloping sides into the bottle for it. By changing the speed at which the bowl spins, the red cells are made to slide

off the shelf into another bottle. The automatic timing device makes possible the separation of the different components.

Science News Letter, August 4, 1951

PHYSICS

Intense Radiation to Find Industrial Chemical Use

► **TWO GLOWING**, intensely emitting bundles of radioactive energy have in each of them as much gamma ray punch as all the radium (2.2 pounds) that existed before the last World War.

The AEC and Brookhaven National Laboratory have announced that these 1000-curie sources of gamma radiation, one made of cobalt 60 and the other of tantalum 182, will be available to industry for experiments that otherwise could not be made.

First tests expected will be to determine the feasibility and safety of using such radiation for killing bacteria and for initiating or accelerating chemical reactions. MIT,

Yale and University of Michigan scientists will work on these problems.

New methods of food preservation with intense gamma radiation will be studied by Columbia University scientists, who will investigate the possible toxicity of irradiated foods.

Brookhaven scientists have used the radiation from a cobalt 60 source to produce a clear plastic compound without the use of heat, pressure, or catalysts usually used in plastics manufacture. Under intense gamma radiation bombardment some molecules break into parts and recombine in other ways, or they polymerize, which means build up large molecules out of small ones.

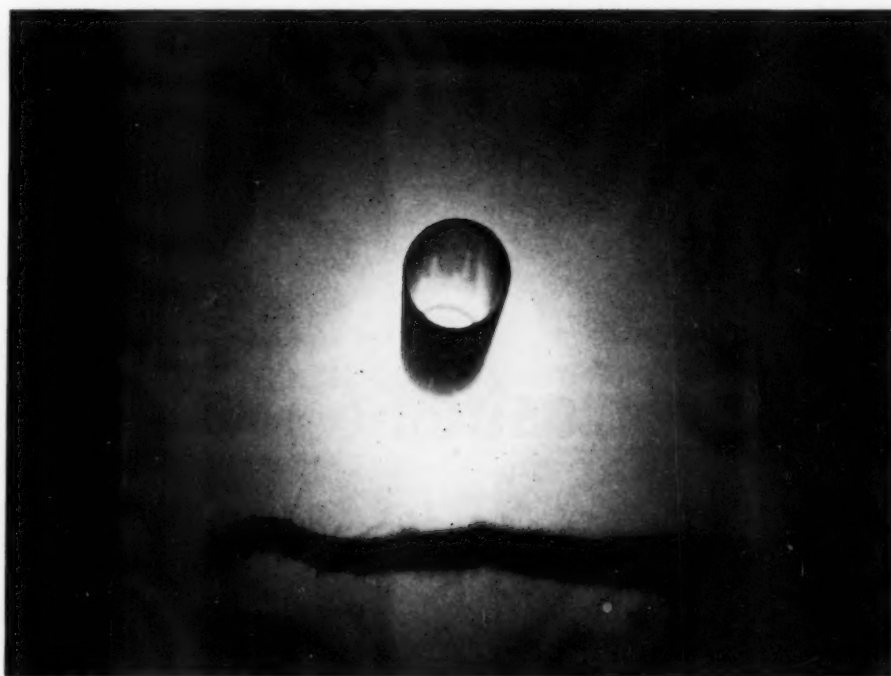
The gamma ray radiating materials are isotopes made in the Brookhaven atomic pile or nuclear reactor. Cobalt 60 has a half-life of 5.3 years, which means that half of its radiation dies out in that time, and tantalum 182 has a half-life of 117 days.

Science News Letter, August 4, 1951

Home Clothes-Drier Uses Electrical Heat

► **CLOTHES-DRYING** machine for the home is deep-freeze sized and uses electrical heat for drying. Patent 2,561,652 was awarded to John Thomas Dooland, Edmonton, Alberta, for this household aid.

Science News Letter, August 4, 1951



THOUSAND CURIE GLOW—Radioactive tantalum is shown here glowing under water, inside a steel pipe before transfer to protective lead shield. Water in this "canal" for radioactive materials provides a shield for technicians who use long, remote control tongs to lift the source into the pipe in the tray, lowered by the rope shown.

GENERAL SCIENCE

Locusts in Iran Subdued

U. S. experts wage successful, air-borne battle against locusts. Other Point Four programs help to bring better health and living conditions to Iranians.

► WHILE PRESIDENT Truman's Ambassador, W. Averell Harriman, is trying to settle the oil dispute in Iran, other Americans are working to bring health and a better standard of living to the Iranians.

Americans are spending, through Point Four, slightly more than one million dollars on down-to-earth aid and training programs for the Iranians. This program may make Mr. Harriman's task easier.

Most dramatic was the recent air-borne battle against a great locust invasion. Millions of locusts threatened some 53,000 acres of badly needed food crops. Under the direction of the Department of Agriculture, eight small airplanes were rushed to Iran and more than 10 tons of a new insecticide, aldrin, were sprayed to stop the invaders.

William B. Mabce, of the office of foreign agricultural relations, who directed the operation, said, "We have been praised by landowner, peasant and tribesman alike, many riding great distances to tell us of the kill, others to request the planes in their own areas."

This and another dramatic program to stop malaria in its tracks serve to pave the way for the more fundamental programs being sponsored by Point Four. The problem is to induce the suspicious and education-lacking Iranians to accept new ideas in agriculture and sanitation. Quick results in locust killing and malaria abating serve to allay the suspicion.

A rural development program, costing almost \$300,000, is setting up a series of 75 village demonstration centers. There, the most rudimentary ideas in agriculture,

health and sanitation are taught to selected Iranians, who in turn are expected to teach them to their neighbors. It is hoped to advance plowing from the primitive scratched-earth methods now in use. Some Iranians need to be taught to wash their hands before handling the food they eat.

Training and leadership programs round out the Point Four operations for Iran. Nineteen trainees are being given instruction in this country, seven in agriculture, ten in health, one in industry and one in meteorology. Under the leadership program, persons who are already leaders in Iranian life are invited to this country for from three to six months to learn what Americans can contribute to their specialties and also to learn about the American way of life.

Science News Letter, August 4, 1951

INVENTION

Orange and Lemon Wastes Yield Valuable By-products

► WASTE CITRUS liquors, obtained from oranges, lemons and other fruit after the juices for canning have been extracted, yield valuable products under a treatment process which brought patent 2,561,072 to Gustave T. Reich of Philadelphia.

In the preparation of citrus juices for the market, relatively light pressure is used so that the products will not contain an over supply of oils and other constituents that are undesirable in a juice for beverage pur-

poses. By subjecting the remaining pulp to heavy pressure what is called waste citrus liquor is obtained. By this process this liquor yields products ranging from citric acid to alcohol and yeast.

In it the liquors are partially concentrated, then subjected to alcoholic fermentation. After fermentation has sufficiently progressed, further concentration is carried out during which the alcohol is removed by evaporation. Then the citric acid is separated from the final concentration, and solid matters dried out as an industrial product.

Science News Letter, August 4, 1951

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Question Box

ASTRONOMY

What happens to old stars? p. 70.

MEDICINE

Besides pumping blood, what function do arteries perform? p. 70.

How was it shown that wiggling toes speeds blood flow? p. 78.

PHYSICS

What is the most recently discovered atomic particle? p. 69.

What rare element has been found in the sun's spectrum for the first time? p. 76.

PSYCHOLOGY

What does a psychologist believe is the best tactic to use in the Oatis case? p. 71.

PUBLIC HEALTH

What ways are there to avoid danger from lightning? p. 72.

RADIO

Where will the world's largest radar antenna be installed? p. 71.

WILDLIFE

What animal stole the show at a campfire talk in Yellowstone Park? p. 73.

Photographs: Cover, American Optical Company; p. 67, Brookhaven National Laboratory; p. 69, Royal Canadian Air Force; p. 71, Raytheon Manufacturing Company; p. 74, Lidgerwood Industries.

PHYSICS

New Theory of Matter

Dirac advances classical, non-quantized way of describing motion of charged matter. Discovery of a new kind of atomic particle, the K meson, is reported.

► A NEW theory of matter gives promise of predicting that all electricity in nature will necessarily be collected into elementary particles.

Dr. P. A. M. Dirac, the noted mathematical physicist of the University of Oxford, England, presented this new way to describe the motion of charged matter at the conference celebrating the 30th anniversary of the Institute of Theoretical Physics in Copenhagen presided over by Prof. Neil Bohr.

The new Dirac treatment is so far classical. It takes no account of the quantum nature of matter and energy (that they can be considered particles as well as waves). Dr. Dirac hopes that the introduction of the quantum into his new equations will automatically make the equations predict that all electric charges in nature will collect into elementary particles. They should also in their quantum form predict the charge on the electron from the values of Planck's quantum constant and the speed of light.

The characteristic feature of Dr. Dirac's equations in their present classical or un-

quantized form is that they do not now leave open the possibility of describing anything but the continuous distribution of matter and electricity. In this way they differ fundamentally from the equations now ordinarily used to describe the electromagnetic behavior of matter. These usual equations have the notion of "elementary point charge" introduced into them from outside, as required by experiment, and not as an inner consequence of the structure of the equations themselves.

The usual theory gives rise to infinite forces and other infinities in the neighborhood of these artificially introduced point charges. Dr. Dirac hopes these infinities will be automatically avoided in the quantum form of the new theory.

Leaders in theoretical physics from all over the world attending the conference expressed interest in the new Dirac theory, but since his ideas were only two weeks old, they have not received investigation by others as yet.

Discovery of a new kind of atomic particle, an addition to the meson family,

has been made in the laboratory of Prof. C. F. Powell of the University of Bristol, England, by C. O'Ceallaigh of Cork, Eire. Mesons are particles found in cosmic rays bombarding the outer atmosphere of the earth with great energies.

The new K meson was reported to the same meeting as a singly charged particle with a mass about 1,000 times that of the electron. Its track in a photographic emulsion showed that it had been brought to rest and undergone radioactive decay into the familiar mu meson plus at least one and perhaps two neutral particles.

At this conference, held to commemorate the establishment of Niels Bohr's institute 30 years ago with Rockefeller Foundation-International Education Board support, 260 invited participants heard also discussion of the so-called V meson particles.

New evidence of the V particles was presented by Prof. Powell and by Dr. C. C. Butler of the Manchester University group headed by Prof. P. M. S. Blackett. Neutral V-particles break up into a positive and a negative particle. Charged V-particles break up into at least one neutral particle and a charged particle. Dr. Butler presented a letter from Dr. Robert B. Leighton and Dr. Carl D. Anderson of the California Institute of Technology which did not uphold the notion that a proton and a negative meson are occasionally the products of decay of the neutral V-meson. Dr. Butler himself reported that he was inclined to believe that some of the tracks he had observed showed protons as decay products.

Several physicists at the conference expressed the hope that the discovery of negative protons is not far away.

There was considerable discussion of the nature of the motions of neutrons and protons within the nucleus and of the distortions of the nuclear surface due to these motions. There is indication that there is an approach being made toward a synthesis of the independent particle or atom-like model of the nuclear interior with the model that pictures the nucleus as a liquid drop.

Science News Letter, August 4, 1951

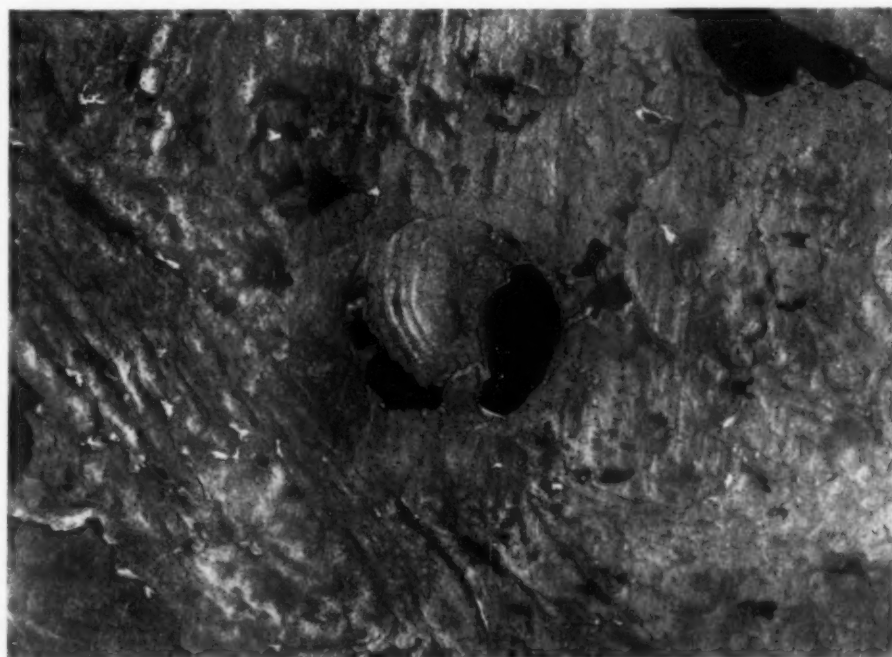
PLANT PATHOLOGY

Sugar Beet Virus Disease Suspected Menacing U. S.

► VIRUS YELLOWS, a disease which drastically cuts sugar beet growth, is now suspected for the first time to be present in the United States. The disease is considered the most damaging menace to Europe's sugar beet crop.

Dr. George H. Coons, U. S. Department of Agriculture plant pathologist, got a positive serological test for the virus on beets grown in Michigan. Although now in a latent, or inactive state, if the virus spreads, it could become a serious menace to the U. S. sugar beet crop. Dr. Coons is now in Europe studying methods of combating the disease.

Science News Letter, August 4, 1951



METEOR CRATER?—Canadian scientists are now studying information collected in the region near Brent, Ontario, where this Royal Canadian Air Force photograph was taken from a height of 35,000 feet. They want to learn, states George Prudham, Mines and Technical Surveys Minister, whether the curious circular depression, visible in the center of the picture, is a meteoric crater.

MEDICINE

Arteries Make Chemicals

Besides piping blood, arteries have now been shown to be important in biochemical activities. Can build complex compounds out of simple ones.

➤ YOUR ARTERIES apparently are even more important to you than anybody has previously suspected, according to a series of experiments that have been completed in the University of California School of Medicine in Berkeley.

In the past most medical scientists have considered the arteries to be somewhat inert pipes through which the blood supply was channeled from one part of the body to another. They were not considered to be important in the body's biochemical activities.

But recent work has shown that the arteries in addition have many of the characteristics of vital organs like the liver. The arteries can build complex and essential compounds out of simple organic materials. And they can break down complex compounds into simple ones. This means the arteries have enzyme systems.

So far the investigators have shown, by keeping animal arteries "alive" in nutrient solutions, that these biological conduits can synthesize cholesterol and phospholipids, both of which are common, complex body chemicals. They have also shown that the arteries use significant amounts of oxygen; that is, that they "breathe."

The research touches on critically important questions that will take years to answer. To what extent are functions now assigned to other vital organs within the province of the arteries? How much biochemical influence do the arteries have on the food-stuffs, in the form of blood, that they transport? How big a role do the arteries play in body chemistry?

The work has been done in the laboratory of Dr. I. L. Chaikoff, professor of physiology. The most recent work, on the synthesis of cholesterol, was reported in *SCIENCE* (June 29) by Dr. M. D. Siperstein, U. S. Public Health Service Fellow, Dr. Chaikoff, and Dr. S. S. Chernick, assistant physiologist.

Cholesterol, a whitish chemical, is associated with hardening of the arteries. Deposits of the chemical are formed on the blood vessel walls, reducing flexibility and the ability of the vessels to carry blood.

The scientists pointed out that it is well known that diet is important in cholesterol synthesis. It had already been demonstrated at Berkeley and elsewhere that the liver and other organs can synthesize cholesterol from simple compounds.

The researchers wanted to know if the artery itself could perform its own synthesis. With the arterial tissue in the nutrient solution they placed acetate, a common,

simple compound, labeled with radioactive carbon. In three hours they isolated cholesterol from the arterial tissue. Presence of radiocarbon in the cholesterol showed that the acetate had been incorporated into the cholesterol by the arteries. While the quantity of cholesterol was small, the synthesis being about one tenth the capacity of the liver, it was consistent.

The scientists concluded that such synthesis probably is a part of a generalized pattern that occurs throughout the body, that it can play a role in hardening of the arteries. They added that the relative roles of diet and of such synthesis in hardening of the arteries remain to be determined.

Science News Letter, August 4, 1951

ASTRONOMY

Old Stars Don't Fade Away

➤ OLD STARS don't fade away, they go off into a series of recurring nuclear explosions like gigantic hydrogen bombs.

Prof. G. Gamow of the George Washington University, Washington, D. C., offers the new theory that unusual stars deviating from the normal array of stellar forms are suffering from hydrogen exhaustion.

The energy that makes the stars shine is due to the thermonuclear transformation of hydrogen into helium. This is a well-accepted idea. Half of the material of normal stars is hydrogen. The life-span of a star is determined by the rate of consumption of the hydrogen, which causes its luminosity.

Brighter stars have shorter life spans. Prof. Gamow finds that stars of zero absolute magnitude, which is much brighter than our sun, will run through their hydrogen in a few thousand million years, that is, a few billion years, which is about the age of the universe. The sun has a potential life, based on the exhaustion of its hydrogen, of about fifty billion years, which means that it should last a long time in the future.

Prof. Gamow in a communication to the British science journal, *NATURE* (July 14), suggests that pulsating variables, red giants, very dense stars, white dwarfs, and various kinds of exploding stars or novae, which are unusual because they are either swollen-up or shrunken, have run out of their original hydrogen supply and are in an unusual final stage of life.

The aging stars that have recurring explosions are visualized as consisting of a

● RADIO

Saturday, Aug. 11, 1951, 3:15-3:30 p. m. EDT
"Adventures in Science," with Watson Davis, director of Science Service, over Columbia Broadcasting System.

Dr. S. Whittemore Boggs, geographer of the U. S. Department of State, discusses "The World's Need for an Atlas of Ignorance."

ARCHAEOLOGY

Mississippians 1500 B.C. Cooked in Wood Vessels

➤ MISSISSIPPI WAS inhabited in 1500 B.C. by people who had not yet learned to make clay pots for cooking, Dr. James A. Ford of the American Museum of Natural History in New York has discovered in excavations just made at Jaketown site, near Belzoni, Miss.

In the preceramic culture which continued until 300 A.D. stones were heated and used for cooking in wooden vessels. There were stone pots, weights and flake stone knives.

Science News Letter, August 4, 1951

core rich in helium surrounded by an envelope rich in hydrogen. These are thought to interact from time to time in a way that Prof. Gamow suggests is analogous to the action of the clapper of an ordinary electric bell which can stay neither at the electromagnet nor the electric contact.

Mathematical equations of what happens in the stars are very complex and Prof. Gamow and his colleagues hope to have the Los Alamos new electronic computer, Maniac, put to work on the problem.

Science News Letter, August 4, 1951

INVENTION

Patented Device Cures Butting Bull or Cow

➤ THE BUTTING bull, steer or cow, that has acquired a habit of attacking other animals, is quickly cured with a "halter weapon" on which patent 2,559,598 was issued to Homer C. Cook, Spokane, Mo.

Essentially, it consists of two triangular metal plates, separated by coil springs, that fit one over the other on the forehead of the animal. A halter holds them in place. The outer plate carries a number of inward-projecting sharp points that pass through holes in the under plate if butting is attempted.

Means are provided so that only minor "wounds" can result, but the pricking is severe enough to break a bad habit. This device might be usable with some other well-known butters not in the bovine group.

Science News Letter, August 4, 1951

PSYCHOLOGY

Best Tactic in Oatis Case

Crossing Communist party line is best argument for U. S. in efforts to free Oatis, since such action strikes at party's self interest.

By Dr. G. M. GILBERT

Author, "Psychology of Dictatorship"

Editor's Note: Dr. Gilbert's expert evaluation of the Oatis case is backgrounded by his experience as prison psychologist at Nuremberg trials where he talked daily with Goering and other Nazi leaders. He won last year the Bernays Award for his studies on reducing international tensions.

► **BEST TACTIC** on Oatis case, as in other phases of psychological warfare against dictatorship, is to keep in step with their own party line. Appeals to justice, threats to break off diplomatic relations, and deals to muzzle Radio Free Europe are all psychologically and politically unsound. We can have the greatest effect with least damage to our own cause only by striking the sensitive chord of Communist self interest as dictated by prevailing party line dictated by Moscow.

At present that line seems to be a switch to Russo-Anglo-American Brotherhood Week in keeping with Moscow's big peace offensive (witness their revival of English language news magazine, etc.) These switches in Communist tactics are often so sudden that their own satellite stooges are caught with their ideological pants down. The one thing that any totalitarian

bureaucrat fears like death itself is to be caught even inadvertently crossing up the party line.

That is our cue. We should concentrate on the theme of taking offense at incidents like the Oatis case just when Russo-American relations were about to take a more peaceful turn.

We need not fear that this theme will fall flat because the Communist peace and brotherhood offensive is all bluff. The new line is of course another switch in the cold war, but I think a genuine and smart move in keeping with their own interests.

If we can convince some commissar that this was an ill-timed blunder in view of the current party line, some Czech bureaucrat will have to take the rap to save another commissar's face and the Oatis case would probably be reconsidered. It will take some kind of a deal to get his release but this ideological psychology is necessary to turn the trick.

Under no circumstances, however, should we sacrifice psychological weapons like Radio Free Europe in the bargaining process. I am sure that that is what is really hurting the Communists. On the contrary we must build up our propaganda defenses because the war is certain to continue on the psychological front after the shooting stops in Korea.

Science News Letter, August 4, 1951



RADAR ANTENNA — This huge scanner, 40 feet wide, is the world's largest commercial radar antenna. Built by Raytheon Manufacturing Company for the port of Le Havre, France, it is shown in position for tests at Deer Island in Boston Harbor.

RADIO

France Gets World's Largest Commercial Radar Antenna

► **THE WORLD'S** largest commercial radar antenna, a 40-foot affair, is the heart of an improved harbor radar system to guide vessels in fog which was recently demonstrated in Boston harbor. The Boston installation is temporary; the equipment was built for the port of Le Havre, France.

The equipment was designed and constructed by Raytheon Manufacturing Company, Waltham, Mass. In the tests made at Boston the giant antenna was installed on Deer Island out in the harbor, together with a battery of four 16-inch radar viewing screens.

Harbor radar, according to Raytheon engineers, is the only system by which a complete picture of all areas of a harbor can be secured, since few ports are so arranged that even in clear weather the whole of the shipping area could be seen. The pictures presented on the battery of giant scopes were so sharp that every buoy and channel marker could be seen.

Harbor radar can be used to direct all types of shipping in a dense harbor fog, provided the vessels have a system for radio communication with the shore. No radar equipment is needed on ship-board. In a master information center, operators keep constant watch on every vessel and objects with which they might come into collision and direct the pilots by word of mouth.

The system is similar to the Ground Controlled Approach used at airports.

Science News Letter, August 4, 1951

MEDICINE

Cancer-Caused Changes

► **DISCOVERIES** WHICH may lead to "a rational approach" to chemical treatment of cancer are reported by Drs. Christopher Carruthers and Valentina Suntzeff of Washington University School of Medicine in St. Louis.

A change in the nature of a body chemical takes place when cancer develops, these scientists find. They have found this change occurring in cancer of the skin of mouse and man and in cancer of the liver and muscle of the mouse.

Differences in the quantities of chemicals in cancerous and normal cells have been discovered previously by various scientists. The newly discovered difference in the nature and structure of a chemical when the tissue becomes cancerous gives scientists a new approach to understanding the chemistry of cancer and, perhaps, to reversing the changed chemistry to normal and thus stopping the cancer.

The St. Louis researchers report in the journal, *SCIENCE* (July 27), that the chemical in normal cells is changed by a process of cleavage during transformation of the cells to cancer cells. The parent chemical in the non-cancerous cells is cleaved by the cancer into two distinct components. The cleavage results in a common biochemical property of the cancers.

The parent chemicals in muscle, skin and liver have somewhat different ultraviolet absorption and polarographic characteristics. But these characteristics in the cleaved products are the same for liver, skin and muscle cancers.

The way in which the cancer cleaves the parent material has not yet been investigated. The St. Louis scientists suspect that it is done by enzymes which are either absent from or blocked in normal tissues.

Science News Letter, August 4, 1951

INVENTION

Improved Garbage Truck Packs Refuse Before Loading

► THE GARBAGE truck on the city streets will be less offensive with an improved type on which American patent 2,561,608 was issued to Ronaldo Boissonnault of Montreal, Quebec. Sicard Inc., of the same city, has acquired the patent rights. It has at its rear a compartment to receive the refuse gathered by attendants. The compartment is hinged to the top of the garbage-holding body of the truck and can be swung into an elevated position to discharge its load with power provided by the engine. An important feature is means for compressing the refuse before it is dumped through a trap door into the body of the truck.

Science News Letter, August 4, 1951

WILDLIFE

Wild Mouse Hunt In New Hampshire

► BOYS AND GIRLS in New Hampshire are trying to catch wild mice of different varieties and bring them to a wild mouse "receiving station" established in Deering, N. H., under the New Hampshire chapter of the Jackson Laboratory Association.

Because of the possibility of discovering in wild animals hereditary traits not found in the inbred strains studied at the Jackson Laboratory, Bar Harbor, Me., young scientists are being encouraged to trap mice, learn how to keep them in captivity, and observe their habits and behavior.

Breeding of the wild mice is planned and when this is successfully accomplished any unusual varieties developed will be donated to professional scientists for further study.

A barn behind St. Mary's Rectory in Deering has been established as a wild mouse laboratory.

Science News Letter, August 4, 1951

PUBLIC HEALTH

Follow Rules on Lightning Danger

► PEOPLE WHO live in the country and city dwellers who spend summer vacations in the country should learn the rules for avoiding being struck by lightning. Summer is the lightning danger season and about 250 Americans are killed by it each year.

The rules are simple. Metropolitan Life Insurance Company safety experts offer these:

Don't seek shelter under a tree, or remain in a broad, open field or small boat, or take refuge in a small, isolated shed in an exposed area during the storm. Never stay in swimming; you can be electrocuted by

a charge carried by the water from a bolt striking at some distance. The baseball diamond and the golf links, as well, can be danger spots when lightning strikes.

Homes properly equipped with lightning rods afford practically complete safety. The steel structures of tall buildings act as lightning rods and thus increase the safety of city dwellers. The metal bodies of automobiles protect the occupants even if the vehicle is struck by lightning.

Lightning deaths strike about five times as often at men and boys as at girls and women. This is what might be expected from the fact that men and boys take part in more outdoor activities both at work and in sports.

Climatic conditions play an important part in lightning mortality. The highest death rates are found in some of the mountain states and bordering areas, including Idaho, Montana, the Dakotas, Wyoming, Colorado and New Mexico. Arkansas, Mississippi, Alabama, South Carolina and Florida are also danger spots. The Pacific coast, New England and the middle Atlantic region have the lowest death rates from this cause.

Rhode Island has had no lightning deaths since 1936.

Science News Letter, August 4, 1951

INVENTION

Removing Clay Under Coal Aids Underground Burning

► THE RELATIVELY new process of making combustible gases by burning coal in the underground natural seams in which it occurs in nature will be aided, it is claimed, by a process of removing clay from under the coal with the aid of water.

For this clay-removal process, patent 2,561,639 was granted to Frederick Squires, Champaign, Ill. Better burning is provided by exposing the under surface of the coal veins, the inventor states.

In the process of gasifying thin layers of coal underground at least two wells are sunk into the coal. Fire is started in one. High pressure air or oxygen is forced down the well to support the fire and to drive the gases of combustion through the coal to the other well for recovery.

To aid the process, which is still in experimental stage, a small tunnel is sometimes dug through the coal from one well to the other before the fire is started. Burning then takes place along the walls of the tunnel.

In the new process the wells extend through the coal into the underlying clay. Water is put down under pressure and is injected into the clay by means of a pipe extending down into it. Water mixed with clay comes to the surface in the space between the pipe and the walls of the drilled well. When the clay is removed between two wells, the water is pumped out and the burning started.

Science News Letter, August 4, 1951

IN SCIENCE

VETERINARY MEDICINE

Sugar Dripped into Vein Helps Sick Cows

► SICK COWS are saved from death by having a sugar solution dripped into their veins over a long period. A new technique that makes this possible is reported by the American Veterinary Medical Association in Chicago.

The method itself, called slow infusion, is widely used in human medicine and for several years has been used for dogs and cats. Its use in large animals has been prevented by necessity to restrain the animal or have someone in constant attendance. The new technique eliminates this need.

The veterinarian suspends a large container of glucose (sugar) solution above the sick cow. A rubber tube is then extended from the jug and connected to a plastic tube inserted in the cow's jugular vein. The plastic tube is rigged so that it sends the fluid very slowly into the blood stream.

The treatment is said to have given excellent results in serious cases of acetonemia and is especially recommended for cattle that are extremely weak.

Acetonemia is a common ailment among dairy cows during the lactation or milking period. Affected animals may lack appetite and get wobbly and stiff or even develop "crazy" symptoms. Milk production declines and the animal loses weight. Unless treatment is begun promptly, the sick cow may go into a coma and die.

Science News Letter, August 4, 1951

TECHNOLOGY

Low-Grade Coal Gives High Heat in New Cyclone Furnace

► WIDER USE of low-grade coal is predicted by engineers of the Babcock and Wilcox Company of Barberton, Ohio, with an improved type of cyclone furnace now being tested under commercial conditions.

A cyclone furnace is a relatively new device which burns crushed coal and other fuels in a whirling tornado of flames within a cylindrical chamber. Fuel and preheated air are injected under pressure at one end of the unit, and high-temperature gaseous products are emitted at the other.

Action of the furnace coats the walls of the chamber with a molten layer of ash into which the fuel is thrown by centrifugal force, the engineers explain. Combustible materials burn, giving up heat and the non-combustible residue melts and drops into a pit as slag.

Science News Letter, August 4, 1951

NEW FIELDS

TECHNOLOGY

Glass Fiber Draperies Now Made in Permanent Colors

► PRIVATE HOMES as well as public places can now have window draperies of flame resistant fiber glass which, by a new process, are given permanent colors without reducing other desirable properties such as wrinkle and abrasion resistance and silk-like softness.

The new dyeing process is the result of work carried out jointly by General Aniline & Film Corporation, General Dyestuff Corporation and the Owens-Corning Fiberglass Corporation. There has been an increasing interest in non-flammable decorations in public places because of a number of recent fires. Glass is noncombustible, making fiber glass draperies highly satisfactory.

Fiber glass has no affinity for ordinary dyestuffs. To give them color, pigments with resin binders were used. Such fabrics, in most cases, had the disadvantage of being too stiff and lacked proper draping qualities. Also the resin binders were not completely flame resistant.

In the new treatment, production of piece goods with silklike softness and drape is accomplished by a new heat cleaning process in which the woven materials are treated for a matter of seconds at high temperatures. This treatment burns off the sizing, renders the fiber soft and pliable, and permanently sets the crimp which gives it wrinkle-resistance.

Affinity of glass piece goods for vat pigments was developed through the cross-linking of methyl vinyl ether maleic anhydride copolymer with polyvinyl alcohol. Modifications of the process make possible the glass fabrics of color fastness.

Science News Letter, August 4, 1951

OCEANOGRAPHY

Ship Sails to Survey Alaskan and Pacific Waters

► TO EXPLORE Alaskan and northern Pacific waters, the *Horizon*, research vessel of the University of California's Scripps Institution of Oceanography, sailed from San Diego last month on a two-month cruise.

Purpose of the cruise is to gather oceanographic information to fill in blank areas on the charts of the Pacific in the area north of the San Francisco-Hawaii steamer lanes and south of the Aleutians.

The cruise will be sponsored by the Office of Naval Research and made in co-operation with the U. S. Navy Electronics Laboratory, San Diego. A distance of about

7,000 nautical miles will be covered on the trip. Standard hydrographic observations will be taken at regular distances, and continuous soundings of the bottom will be made.

First feature to be studied on the cruise will be the Mendocino escarpment, giant submarine cliff that extends several hundred miles due west of Cape Mendocino in northern California. Attempts will be made to dredge samples on the northern ridge of the escarpment.

Eleven hundred miles west of the coast, the vessel will turn north to the center of the Gulf of Alaska. Samples will be dredged from the tops of seamounts south of the Alaskan peninsula.

The *Horizon* will then call at Kodiak, in the only stopover of the trip, before sailing southwestward along the Aleutian trench to Unimak Pass. From Unimak Pass it will turn southward on an 1,800-mile voyage to a point approximately 500 miles northeast of Honolulu. Thence it will work its way back to San Diego along a suspected escarpment, facing the Mendocino escarpment, in the vicinity of 33 degrees north.

Science News Letter, August 4, 1951

WILDLIFE

Badger Steals Show At Yellowstone Talk

► TOURISTS EXPECTED to hear a talk on wildflowers when they attended a National Park Service campfire talk in Yellowstone Park, Wyoming, recently, but a badger stole the show from the ranger-naturalist.

While the program was under way, a very large badger with a ground squirrel in its mouth came out of its den just before dark, just above the projection screen. It made three appearances. Wildflowers were forgotten as the badger put on its act.

The out-door amphitheater at Mammoth Hot Springs is an excellent place to view the park's wildlife. Elk, coyote and bear have made guest appearances at evening lectures. Moles inhabit the area and nightly race between the log seats to the delight of some travelers and to the horror of others.

Science News Letter, August 4, 1951

MEDICINE

Cortisone for Eye Diseases By New Production Method

► A NEW method of producing cortisone, famous anti-arthritis remedy, has been developed by Schering Corporation of Bloomfield, N. J. First Schering cortisone product to be put on the market is a specially developed product for use in eye diseases. It is called Cortogen Acetate Ophthalmic Suspension and is sold only on prescription.

Science News Letter, August 4, 1951

CHEMISTRY

Cholesterol, Body Chemical, Synthesized for First Time

► CHOLESTEROL has been synthesized as another step in the chemical understanding of important and characteristic substances in the living body.

What is called "the total synthesis of cholesterol" is announced in the JOURNAL OF THE AMERICAN CHEMICAL SOCIETY (June) by the same team of Harvard chemists who have been making various kinds of drug substances, like the sex hormones and cortisone, from chemicals that do not have their origin in animal products often expensive and difficult to obtain.

Total synthesis means that the starting point in building up the material is a relatively simple chemical, usually found in coal tar, and there are added to it, step by step, other relatively simple substances until the complexities of the natural substance are achieved.

Cholesterol is the derivative of fatty substances and is found in blood and other parts of the body. It is called "the characteristic sterol of higher animals."

Drs. R. B. Woodward, Franz Sondheimer and David Taub, working in the Converse Memorial Laboratory of Harvard University in Cambridge, synthesized cholesterol as a part of an extensive research in which they simultaneously have achieved the total synthesis of some naturally occurring steroids, among them the hormones desoxycorticosterone, progesterone, and testosterone.

Cholesterol is of special interest because of the controversy over the part that it plays in causing arterial hardening when present in excessive amounts in the blood.

Science News Letter, August 4, 1951

INVENTION

Talking Escalator Announces Bargains

► THE DEPARTMENT store moving-stairway, or escalator as it is called, will be able to "talk" to its riders with a device on which the government issued a patent.

The device is a series of loudspeakers in the stationary side walls of the escalator which will repeat over and over again the goods the customer will find on the floor being approached. The story it will tell is similar to the familiar one now repeated by elevator operators.

The messages will be of such length that the complete story is told in the time required for the passenger to be raised from floor to floor. The voice will be loud enough to reach the escalator users but not to disturb customers on the sales floors.

Patent 2,561,959 was issued to Maarten van der Reis of New York City for this moving-stairway broadcasting device.

Science News Letter, August 4, 1951

TECHNOLOGY

Ships with Fins Combat Nausea

New age of comfort for ocean travelers promised by gyroscopically controlled "wings" that keep ships from rolling sidewise, the motion that most often causes seasickness.

By ERIC BENNETT

► FOR THOSE whose stomachs rise when they go down to the sea in ships the story of the Denny-Brown ship stabilizer brings the promise of a new age of comfort: because this device, perfected after 20 years of experiment and usage, can keep a ship of any size from performing that sideways roll so devastating to digestions, crockery and unsecured grand pianos.

During the war the British navy fitted this stabilizer to 109 ships. Now it is in service for the first time on a big liner, and passengers who once crossed the China Sea clinging to bunks that bucked like broncos play deck games and drink tea from cups that stay on tables when they are put down. The new 24,000-ton Peninsula & Oriental liner *Chusan*, plying between London and India, Singapore and Hong Kong, was fitted with the Denny-Brown device, and her first year afloat has convinced the shipping world of the stabilizer's success.

In the deepest bowels of the ship, some 20 feet below the waterline and just above the keel, is the stabilizing gear. When the captain presses a button, the engineer starts the motors which power the device and the gyroscopes which control it. The captain now turns another switch, and from each side of the ship at its maximum width, a fin slides out into the water a few feet above the ship's bottom. Each fin is rather like a small airplane wing, with a hinged tail flap.

Diminutive Wings

When the fins are fully extended—that is, when the ship's sides have fully sprouted their diminutive wings—the captain moves another switch and the fins come under control of the gyroscopes: they flap up and down like a pair of rudders and within a few seconds the roll of the ship has been ironed out. The *Chusan's* gyrochart shows that a roll of $9\frac{1}{2}$ degrees (that is, $4\frac{1}{4}$ degrees to left and right of vertical) can be reduced almost instantaneously to a gentle $1\frac{1}{4}$ degrees (or only $\frac{1}{8}$ of a degree each way).

The astonishing thing about the fins is their size in relation to the ships they stabilize. Each fin on the *Chusan* projects only 12 feet from the side of the ship: its fore-and-aft measurement is six feet six inches, compared with the liner's over-all length of 672 feet. When not in use the fins are withdrawn into the steel housings on each side of the hull.

Shipbuilders have tried various devices to counteract roll. The Sperry gyrostabilizer, installed on several large liners, was costly and heavy. The three gyroscopes fitted to the 48,000-ton Italian liner *Conte di Savoia* weighed 250 tons apiece. Their effectiveness did not seem to warrant their cost, weight and space.

Yet long before all this a Scotsman had thought out the oscillating-fin principle on which the Denny-Brown apparatus is based. In 1890 Andrew Wilson, a chemist of Stirling, took out a patent for an "Apparatus to Control the Rolling and Pitching Motions in Vessels." Wilson's idea was to have fins on each side of the hull to check rolling. It does not appear that his device was ever tried out.

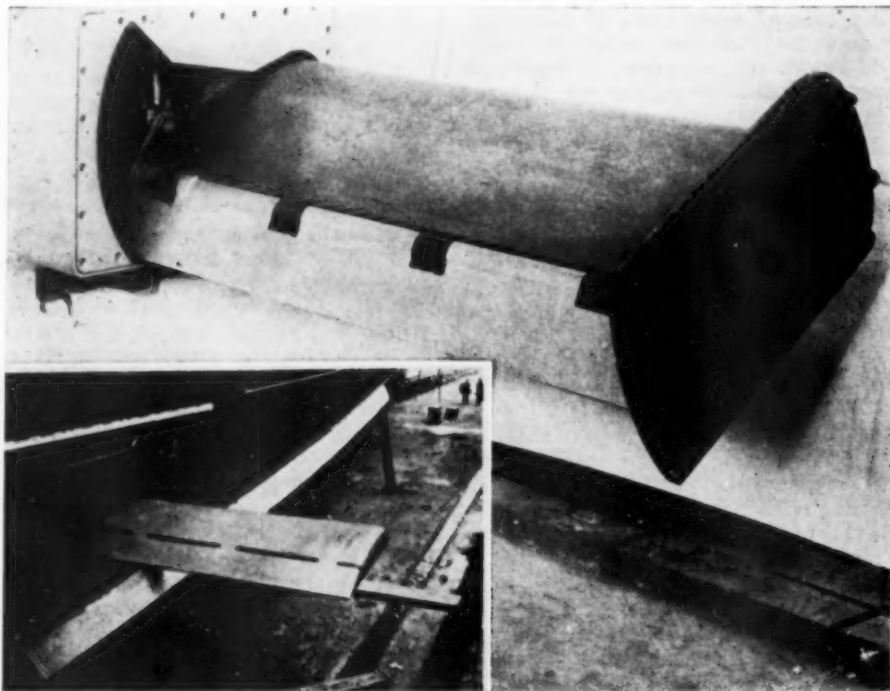
Then, in the early 1930's, Dr. S. Motora, of the Mitsubishi Shipbuilding and Engineering Company, designed a fin stabilizer which was fitted to three ships. But the Japanese device was not successful because it lacked a mechanism which would oscillate the fins quickly enough. To be successful a stabilizing device must begin to counteract the roll of the ship as soon as

that roll begins. In a small ship, where the roll is rapid, the changeover in position of the two fins must take place in less than a second.

In Edinburgh, Sir William Wallace heard of Dr. Motora's work and put his firm to work perfecting the Japanese device. Sir William (he was knighted in 1951) is chairman and managing director of Brown Brothers & Company, Ltd., a firm with a world-wide reputation as manufacturers of ships' steering gears. Sir William needed the help of a shipbuilding firm which had an experimental tank. He approached the biggest firms in Britain. One after another they turned him down. There was the sound of mocking laughter on Clydeside and in Liverpool. They had had enough of ship stabilizers.

Then he went to Sir Maurice Denny, chairman of William Denny and Brothers, Ltd., of Dumbarton, Scotland. Denny's has the oldest-established model experimental tank in Britain and it specializes in building Channel steamers and packet boats. Sir Maurice finally accepted the proposition. Five years of experiment followed.

By 1936, the Denny-Brown stabilizer was a practical possibility. All its sponsors had to do was to persuade a shipowner to install one. The Southern Railway agreed to have a stabilizer put in the old Channel



STABILIZING FIN—How the "Denny-Brown" ship stabilizing fin looks when the nose of the fin is tilted up is shown in this photograph. The insert illustrates the fin in position on a ship.

steamer, *Isle of Sark*, provided that Denny's and Brown each paid a third of the cost.

That stabilizer was crude compared with the latest model. Today at Denny's and at Brown's they talk in a rather shamefaced manner about that job. But it worked. It worked so well that the Southern Railway paid two thirds of the cost. It worked so well that the Admiralty became actively interested.

Trials Are Convincing

Extensive trials with the naval sloop *Bittern* convinced the Admiralty that they were on a good thing. By 1939 Brown's was told to stop advertising the stabilizer. There was a war in the offing, and it stands to reason that if you can stabilize a ship so that cups don't break and passengers stay upright, you also have a ship which provides a steadier gun platform.

The *Bittern's* anti-aircraft fire, in the Norwegian campaign of May 1940, was so effective that it led to her doom. The Germans concentrated their attack on the sloop and set her on fire.

The gyroscope is the brain of the controlling gear. The spinning wheel indicates the immediate movement of the ship in a roll, and as soon as it shows a lean one way it breaks an electrical contact which moves the fins into the required position. When the ship rolls the other way the gyroscope breaks another contact and reverses the position of the fins.

The continuous control unit now used is based on two gyroscopes: one vertical, with the spinning wheel standing upright, which measures the departure of the deck line of the ship from a flat level, the other horizontal, which measures the rolling velocity of the ship. By a delicate system of electrical transmission these two motions are added together algebraically and the sum is passed on to an oil motor which copies the motion

with increased power, eventually operating the valve of the fin-tilting gear so that the angle of the fins corresponds exactly to the gyroscopic signal at every second. Both gyroscopes used in the *Chusan* weigh only 375 pounds, in contrast with the enormous wheels of the old gyrostabilizer, which weighed 250 tons.

Now the big shipping lines are after the stabilizer. The P. & O. directors have decided to make it standard equipment in their fleet which runs between Britain and the Far East. The Orient line, which operates between Britain and Australia, is also ordering the Denny-Brown for some of its finest ships. The Cunard-White Star has ordered a stabilizer for its 13,345-ton transatlantic liner *Media*. On their experience with that ship, this line presumably will decide whether to go ahead and fit the device to the *Queens*.

When great ships meet a heavy Atlantic sea there can be real trouble. In February 1950 the *Queen Mary* developed a roll of 30 degrees. Sleepers were flung out of their berths; tables, chairs and other furniture were overturned and flung loose, and thousands of pieces of crockery were broken. More than 50 persons were injured. The ship could steam only at 19 knots instead of her usual 29 and she was 25 hours late on the crossing. Less than a month later 15 passengers were hurt when the *Queen Mary* again rolled in a heavy sea.

Nothing may be said yet about naval plans, but it is obvious that if the stabilizer can turn a small ship into a steady gun platform—as it did with the *Bittern*—it can make an aircraft carrier almost as safe as a landing ground.

This article was prepared for SCIENCE NEWS LETTER in cooperation with the READER'S DIGEST. It will appear shortly in that magazine.

Science News Letter, August 4, 1951

AERONAUTICS

Refuel Jet Fighter in Air

➤ WITH THUNDERJET fighting planes now rolling off production lines fully equipped with accessories needed so that they can be refueled in the air from flying tankers, the jet aircraft becomes a more efficient war weapon.

The plane so equipped can remain in active combat a larger percentage of the time because it does not have to travel to a distant airport and land for fuel. Tanker planes can circle about in the air in safe zones relatively near the fighting area. Only a few moments are required to load the jet fighter with a full supply of fuel with the modern equipment now used.

Other planes in addition to the Thunderjets are also being equipped for refueling in the air. The Thunderjet, a product of Republic Aviation Corporation, Farmingdale, N. Y., is one of the principal types

in active service in the Korean area. It is in the 600-mile-an-hour class. The new version of the plane, in which the refueling equipment is standard, has other improvements that give it longer range, faster climb and provide for easier maintenance.

The refueling of planes in the air is not something entirely new. The American stunt planes that stayed in the air for many days, hoping to achieve records, were refueled in flight but the systems employed were crude. Following World War II, British interests tackled the problem seriously and developed equipment which they expected could be successfully used to refuel long-distance transports on overseas trips. About the same time, the U. S. Air Force started experimental work in air refueling, using both British and American equipment.

In the refueling process, the tanker plane flies above and a little to the front of the craft to receive the fuel. The tanker is equipped with what is called a flying boom. This rigid feeder pipe, which can be lengthened and shortened by telescopic action, can also be moved to the right or the left by the use of V-shaped surfaces known as ruddevators. It is operated by a crewman in the tanker. When its nozzle is inserted in the socket of the receiving plane, fuel is passed through under considerable pressure, greatly lessening contact time.

Science News Letter, August 4, 1951

FREE at Last From the Handicaps of DEAFNESS



How wonderful to be so amazingly free of deafness! Now I hear even whispers with crystal clarity—enjoy music, movies, church—the whole glorious world of sound far beyond my highest hopes! And it all started when I sent for information about the revolutionary "electronic ear" recently perfected by a noted Chicago electronic scientist. Why don't you find out about it, too. No cost—no obligation—just mail the coupon.



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Snails

► **QUAINT, COILED,** curious, humble little things, with their houses packed on their backs, snails have been objects of interest to many generations of boys, and of their elders as well.

"Slow as a snail" is proverbial, but in justice "patient as a snail" should be added also, for these leisurely travelers can make surprisingly long journeys if you give them time enough.

Snails belong to the great zoological group known as mollusks, which includes also such diverse creatures as oysters and clams, cuttlefish, rock limpets and chitons. They are classified as "gasteropods," which means "stomach-foot," because the broad, flat muscular pad, or foot, on which it moves is the most prominent thing about the lower part of the snail's body.

Plastered firmly on the rock or plant stem, the snail progresses by a succession of rhythmic waves in this foot, that start at its rear and slowly push through to the front. Each wave sets the snail forward on its way a small fraction of an inch.

Perhaps the most interesting things to children about a snail are its stalked eyes, which it can pull back into its body like a flash at a touch. These eyes are of a very primitive structure, and it is extremely doubtful whether the snail can do

more than distinguish light from darkness, and perhaps detect motion in nearby bodies. Certainly the snail is very near-sighted, for it does not "pull in its horns" until you almost touch them.

Some snails carry on the upper side of the rear part of their bodies a little oval trap-door, which exactly fits the opening of their shells, so that when they withdraw into their houses for safety they have this extra barricade. In addition, all snails secrete a sticky slimy substance, which is another means of defense.

In a sense, snails are strangers from another world, for their home ties are strongly with the world of queer beings that live in the water. The snail is the only mollusk that has come ashore to live, and even at that, there are more snails that continue to live in the water than there are land-lubber snails. Land snails keep a strong memory of their old home, for they like deep woods and other damp habitats; a snail in the desert would be an anomaly.

This inability of snails to endure long drought is responsible for one of the best examples we have of evolution actually in progress. There are several volcanic islands in the South Pacific, on which deep, moist canyons are cut off from each other by high walls of lava rock. The upper parts of these ridges are extremely dry, veritable desert strips while the canyon bottoms are rich, wet, tropical jungles.

Each of these canyons has its own separate species of snails, which, unable to cross the ridges and mingle with its neighbors on either side, has developed its own peculiarities. On one of these islands, two surveys of the snail population, made at an interval of several years, have shown changes to be taking place even in so brief a time.

Science News Letter, August 4, 1951

PHYSICS

Sun May Make Technetium

► **ONE OF** the chemical elements that had to be manufactured by atomic bombardment in order to be discovered on earth has been identified in the sun.

It is element 43, technetium. It is most plentifully obtained now as a product of the fissioning of uranium atoms in AEC nuclear reactors at Oak Ridge, Tenn. It is an explosion product of the atomic bomb.

The National Bureau of Standards has observed the first and second spectra of this rare element, using Oak Ridge samples of Tc, as the element is known according to its symbol. These were matched with the spectrum of the sun.

Dr. Charlotte E. Moore-Sitterly, working with Dr. W. F. Meggers in the Standards' spectroscopy laboratory, found one line in the second order spectra of both technetium and the sun that matched. On this basis there is a good chance that technetium exists in the sun among the least abundant elements.

NATURAL RESOURCES

Canadian Petroleum May Meet All Domestic Needs

► **CANADA'S RELATIVELY** recently discovered fabulous oil fields in the Province of Alberta may soon make the nation independent of petroleum products imported from the United States. This means to the United States a more abundant supply for uses at home.

In 1947, when the first oil strike in Alberta was made near Leduc, Canada was producing only about 7% of the oil it consumed, the American Society of Mechanical Engineers was told by Dr. Oliver B. Hopkins of Imperial Oil, Ltd., of Canada. Alberta fields now meet about one-third of Canadian needs of 350,000 barrels daily.

Leduc field, and the later discovered nearby Woodbend pool, together have an estimated 200,000,000 barrels of recoverable petroleum. The more recently discovered Redwater deposits some 35 miles northwest of Edmonton contain perhaps 500,000,000 barrels of crude. Dr. Hopkins pointed out that the Redwater volume is more than the average reserves discovered annually in the past ten years in all the new fields in the United States.

Important in the Canadian oil industry is a pipeline from the Alberta fields to refineries in the Lake Superior region of Ontario. It is now planned to increase the capacity of this line by the addition of six new pumping stations.

Also planned is the construction of 2,600,000 barrels of additional storage at Lake Superior. Tankers on the Great Lakes will transport Alberta oil products from Lake Superior to Canadian ports on the other lakes.

Science News Letter, August 4, 1951

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GENERAL SCIENCE

Pressured To Serve Reds

► **THIRTY-FIVE HUNDRED** Chinese students now in 530 American educational institutions study today in fear they may be forced to use their learning for the Chinese Communists. Of this number, 2,817 are studying on American taxpayers' money. These had been carefully screened and found to have no leftist tendencies.

Already back in Asia are 365 students. How many went to Communist China, how many went to Formosa and how many stayed in Hong Kong, the State Department does not know. One group of 27 recently were escorted through Communist lines by Hong Kong police, declaring that they were going to "serve the people" of Communist China.

Many of the 3,500 Chinese students still in this country believe that most of those 27 who walked over the line did so because of blackmail. Their families were in Communist China. They were made to fear for the safety of their families. Hence they took back American-made educations to "serve the people."

In 1950, the 81st Congress passed the Emergency Aid to Chinese Students Act to help students stranded here by the victory of the Communists on the Chinese mainland. Since then, two Congressional appropriations and one \$500,000 grant from the Economic Cooperation Administration

have given \$10,500,000 to pay for education, subsistence and fares back to China for 2,817 students. This money will last until the end of 1952, when it is expected that all students will have completed their education.

Last April, new regulations went into effect in the Department of Justice's Immigration Bureau, permitting Chinese students to stay in this country after they had completed their education, provided they are gainfully employed. However, if they express a desire to go back to Communist China, there is no way to stop them. There is no way of telling whether they actually want to live in Communist China or whether they are going back only to protect their families from the authorities.

Communist China stands to gain much scientific, technical and engineering skill at the expense of American taxpayers from those who can be forced back onto the Asian mainland. Of the 27 who the other day walked over the border from Hong Kong, eight had received degrees in science.

This story parallels recent reports of blackmail of other Chinese who live in this country. Chinese-Americans with relatives in China, according to these reports, are being forced to pay money to the Communists for the safety of their relatives behind the Asiatic iron curtain.

Science News Letter, August 4, 1951

NUTRITION

Enriched Rice Stops Deaths

► **BERI-BERI DEATHS** have been stopped in Bataan, the Philippines, now that rice sold there is being enriched with the anti-beri-beri vitamin, B₁, or thiamin.

This life-saving feat is accomplished by treating about half a pound of rice out of every 100 pounds sold. Dr. Robert R. Williams, the chemist who synthesized this vitamin, reports.

Dr. Williams has just returned from a trip around the world during which he visited the great rice producing countries. He told of conditions in these areas when he spoke as guest of Watson Davis, director of SCIENCE SERVICE, on Adventures in Science, radio program produced under the auspices of SCIENCE SERVICE over the Columbia Broadcasting System.

Rice is a food staple for millions upon millions of the world's people, Dr. Williams pointed out. But as the rice eating races of the world have concentrated more largely in cities, they have gotten away from the hand-pounding of rice that used to be practiced. As a result, nutritional and deficiency diseases have increased.

When rice is milled nutrients are lost so that beri-beri is still a great killer of

mankind, although it is known that this disease is prevented by vitamin B₁.

Production of white rice is necessary for far away markets in order that the rice may keep and be stored. However, the vitamin content can be restored to the rice by the process that Dr. Williams advocates. This involves treating only about a half pound of rice out of every hundred that is sold, restoring to these relatively few grains the necessary vitamins synthetically and then mixing them when the rice is sold to the people for food.

This method has been given a long term test in Bataan, Philippines, where vitamin-enriched rice has been used for over two years and a cessation of deaths due to beri-beri has occurred, whereas deaths from this deficiency disease were very prevalent in the past.

It looks and tastes like ordinary rice and costs only about 1% more. One of the problems in connection with introducing enriched rice in India, Burma, China, Java and Japan and other areas where beri-beri is prevalent is the introduction of the necessary synthetic vitamins into these areas under present conditions of foreign ex-

change. Although the amount of synthetic vitamins is very small, relatively speaking, they can most effectively be produced in western countries and the problem of the eastern areas is to find the necessary American money to buy it.

Dr. Williams is a member of the Baptist Board of Foreign Missions and has conducted his present introduction of enriched rice under the auspices of the Williams-Waterman Fund for combat of dietary diseases, a fund which he and his associates set up by assigning to it their vitamin B₁ patents.

Science News Letter, August 4, 1951

PSYCHOLOGY

Weight Lifter Called Sissy by Psycho Tests

► **THE WEIGHT-LIFTING** strongman is a sissy!

This is indicated by psychological tests given to two groups of young athletes. One group had an enthusiastic interest in weight lifting, the other consisted mostly of basketball and volleyball players comparable to the first group in age, education, socio-economic status, and interest in athletics.

The weight-lifter, it turned out, is covering up for a feeling of inadequacy and inferiority as a man. He is concerned with demonstrating that he is a real he-man, because of these lacks. He is strongly dependent and feels that he has been rejected. He is hostile toward his mother and is not fond of girls in general. He is very fond of himself.

This study, the results of which confirm Freudian theories, was conducted by Dr. Robert G. Harlow, of Harvard University, who makes his report in the JOURNAL OF PERSONALITY (March).

Science News Letter, August 4, 1951

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MEDICINE

Average M.D. Nets \$11,000

► DOCTORS IN 1949 had an average net income before taxes of \$11,058.

This figure is from a survey conducted jointly by the Office of Business Economics, U. S. Department of Commerce, and the American Medical Association.

The \$11,058 income was for physicians engaged in civilian practice, including salaried as well as independent practitioners, but excluding interns, residents and teachers. About four out of five physicians get most of their medical income from independent practice. Their average income was \$11,858 compared with \$8,272 for the salaried physicians.

Physicians' incomes have more than doubled since 1929, "but this relative increase was practically identical with that for all earners in the general population over the same period," the survey report states.

About 13% of the independent physicians made less than \$3,000, and about 8% made more than \$25,000.

Specialists had the biggest net incomes, as most persons would guess. But among the specialists in independent practice, the ones averaging the second highest income were pathologists, a group almost unknown

to the layman, whose work consists largely of important behind-the-scenes laboratory examinations for diagnosis.

Highest net income among independent specialist physicians was reported by neurological surgeons. Lowest average income reported by specialists was that for pediatricians. To some extent, the size of the average income depended on the size of the group practicing that specialty.

Physicians' net incomes ranged from a loss of about \$5,000 to a net profit of more than \$200,000. Almost one out of every 100 reported a loss in 1949, while one out of 15 reported more than \$25,000.

Where a doctor practices makes a difference in his income. Highest average incomes were reported in the Far West, lowest in New England. The highest average incomes were found not in large cities but in those of about 350,000 population.

Physicians reach their peak average earnings between the ages of 45 and 50.

The survey figures were obtained from replies to questionnaires sent to 125,000 physicians. Of these 55,000 sent responses and 30,000 replies, unsigned and unidentified, were used for the final analysis.

Science News Letter, August 4, 1951

PHYSICS

Convert into Solid Plastics

► CATHODE RAYS, similar to those used in television receivers, are being used experimentally in General Electric laboratories in Schenectady, N. Y., to convert liquid raw materials into solid plastics. The process is not entirely new but it is hoped, with the high-voltage electron beams now available, that it may be put into wider use.

An essential part of the manufacture of plastics, G. E. scientists explain, is a process called polymerization. In this, small groups of atoms are linked together to form long chains. The individual groups can move around freely, so that they form a liquid. The chains make a rigid, solid structure.

Generally, chemical means are used to initiate the polymerization which, when once started, proceeds rapidly in a chain reaction. Such polymerization is being successfully achieved by Dr. John V. Schmitz and Elliott J. Lawton with a beam of electrons with energies of 800,000 volts obtained from a modified million-volt X-ray machine.

The basis of this present work is success obtained 25 years ago by Dr. William D. Coolidge, former director of the G. E. research laboratory, in which he converted castor oil into a solid with X-ray bombardment. Other compounds, such as ethylene, were similarly polymerized.

The joining together of the individual molecular units to form the long chains, or polymers, results from a rearrangement in the electrons in the atoms, Dr. Schmitz stated. Ordinarily they are rearranged by chemical action. The same effect is obtained by firing other electrons, with high speed, at the liquid made of the separate units. These hit a few of the atoms, he continued, either knocking their electrons out, or else sticking and increasing their number. With a small proportion of the atoms thus altered, the reaction starts and proceeds through the volume of liquid exposed to the rays.

Science News Letter, August 4, 1951

MEDICINE

Wiggling Toes Speeds Blood Flow, Isotopes Show

► DOCTORS HAVE the evidence of atomic isotopes to support their telling bedridden patients to wiggle their feet to prevent blood from congesting in the legs and to reduce the danger of blood clot formation.

Dr. H. Payling Wright, of University College Hospital, London, reported to the Isotope Techniques Conference in Oxford that he had studied the rate of blood flow

through the legs by injecting radioactive salt solution into the veins of the foot. He measured the time it took for the radioactive material to reach a Geiger counter placed at the groin.

He discovered that the normal lying-down blood flow rate of about two inches a second is doubled if the bed is tilted to an angle of 30 degrees with the person's feet above his head, or if the person wiggles his feet back and forth for two minutes. In the case of the wiggling, it is the movement of the leg muscles which speeds up the flow of blood.

These methods can be applied to bedridden patients, in whom the blood flow tends to become sluggish due to immobilization of the leg muscles and loss of muscle tone.

Science News Letter, August 4, 1951

METALLURGY

Titanium Metal Produced by New Lower-Cost Process

► STEP BY step, the metal titanium is coming into its own. With new processes for reducing it from its plentiful ores, this structural metal is passing out of the list of the "little-known" into the list of "common" metals to take its place side by side with steel and aluminum.

Titanium as a common metal is passing through stages of production and applications similar to those in the history of aluminum. Both of these metals were long known before they could be produced economically by commercial processes. During World War II, the U. S. Bureau of Mines developed a method of obtaining relatively pure titanium at a reasonable cost but not low enough for general commercial production.

Since then improved processes have been developed by other agencies, both public and private. Among them is the Office of Naval Research, backed by the certainty that this metal and its alloys can serve many useful purposes in naval construction.

After several years of work by Naval Research, it is now announced that a process has been developed by which the metal can be obtained at about one-fifth of present costs. This means titanium at \$1 a pound instead of the present \$5-a-pound cost. The new process was developed by Horizons, Inc., Cleveland, Ohio. Pilot-plant stages in production have been reached.

Titanium is a light, strong, corrosion-resistant metal. In weight it is between steel and aluminum, being about 70% heavier than the latter. It is a structural metal, as strong as steel. Extensive uses are predicted in airplanes and in ship construction. Its principal uses will probably be in alloys. The Navy has already achieved a titanium-aluminum-chromium alloy which is expected to have extensive applications in jet aircraft.

Science News Letter, August 4, 1951

Books of the Week

TO SERVE YOU: To get books, send us a check or money order to cover retail price. Address Book Dept., SCIENCE NEWS LETTER, 1719 N St., N. W., Washington 6, D. C. Ask for free publication direct from issuing organizations.

ATLAS OF CROSS SECTION ANATOMY OF THE BRAIN: Guide to the Study of the Morphology and Fiber Tracts of the Human Brain—A. T. Rasmussen—*Blakiston*, 66 p., illus., \$5.00. This atlas for students and specialists is based on the fifth section of Emil Villiger's "Brain and Spinal Cord," 14th edition.

BIRDS OF NEGROS ISLAND—Austin L. Rand—*Chicago Natural History Museum*, 25 p., paper, 30 cents. Rare birds found by Silliman University, Philippines, and the Chicago Natural History Museum.

CHECK LIST OF FOSSIL INVERTEBRATES DESCRIBED FROM THE MIDDLE DEVONIAN TRAVERSE GROUP OF MICHIGAN—Erwin C. Stumm—*University of Michigan Press*, 44 p., paper, 75 cents.

COLLEGE ZOOLOGY—Robert W. Hegner and Karl A. Stiles—*Macmillan*, 6th ed., 911 p., illus., \$6.00. Users of this standard text in zoology will welcome this revised edition with improved illustrations, a wider geographic range of animals and an extensive glossary.

COMPARATIVE PSYCHOLOGY—Calvin P. Stone, Ed.—*Prentice-Hall*, 3rd ed., 525 p., illus., \$8.00. Revision of this well-known text book to keep it up-to-date on the specialized aspects of genetics, neurophysiology, and endocrinology.

CURRENT SCIENTIFIC RESEARCHES IN MELLON INSTITUTE, 1950-1951—*Mellon Institute*, 52 p., illus., paper, free upon request to publisher, 4400 Fifth Avenue, Pittsburgh 13, Pa.

A FLIER'S WORLD—Wolfgang Langewiesche—*McGraw-Hill*, 278 p., illus., \$3.75. A collection of articles presenting a pilot's view of the world, and the feel of flight.

FLOWERS OF THE SOUTHWEST MESAS—Pauline M. Patraw and Jeanne R. Janish—*Southwestern Monuments Assoc.*, 112 p., illus., paper, \$1.00. Vacationists in the Southwest will be able to identify readily the plants of that area with this booklet in hand.

GEOLOGIC MAP OF THE UNITED STATES—George W. Stose—*U. S. Geological Survey*, 4 sheets, 25x43 inches, colored, \$2.50. Reprint of the 1932 edition, scale 1:2,500,000 and containing sources of data listed by States. Order direct from U. S. Geological Survey, Washington 25, D. C.

GUIDED MISSILES: ROCKETS & TORPEDOES—Covering the Principles and Techniques of the Missiles of Today and Tomorrow—Frank Ross, Jr.—*Lothrop, Lee & Shepard*, 186 p., illus., \$2.75. A non-technical book about guided missiles, artificial satellites and the future of the rocket in interstellar space.

IMPROVING SCHOOL HOLDING POWER: Some Research Proposals Circular 291—Office of Education—*Govt. Printing Office*, 86 p., paper, 40 cents. The problem of keeping children in school as discussed at the Work Conference on Life Adjustment Education.

JOHNE'S DISEASE (PARATUBERCULOSIS) OF CATTLE: U. S. Dept. of Agriculture Circular No. 873—Aubrey B. Larsen—*Govt. Printing Office*, 8 p., illus., paper, 10 cents. Symptoms, cause, diagnosis, control, and elimination of cattle found with this chronic infectious disease.

LEARNING TO SWIM IN 12 EASY STEPS—Alfred Kiefer, Milton A. Gabrielson and Bramwell W. Gabrielsen—*Prentice-Hall*, 117 p., illus., \$3.00. An Olympic champion and two coaches offer this self-teaching guide to the 50% of the people of the United States who can not swim because they lack a teacher or fear the water. Papa can use it to teach Junior.

MAMMALS FROM BRITISH HONDURAS, MEXICO, JAMAICA AND HAITI—Philip Hershkovitz—*Chicago Natural History Museum*, 22 p., paper, 30 cents. Describing animals found by the Ivan T. Sanderson expedition to the Caribbean area in 1939-1940.

MECHANICAL SOLUTION OF FORMULAS FOR GROWTH RATES—Robert V. Kesling—*University of Michigan Press*, 6 p., paper, 50 cents. Containing scales from which a rapid solution of Huxley's and Schmalhausen's formulas can be read.

A NEW GENUS AND SPECIES OF PRIMITIOPSID OSTRACOD FROM THE DEVONIAN TRAVERSE GROUP OF MICHIGAN—Robert V. Kesling—*University of Michigan Press*, 9 p., illus., paper, 50 cents. Describes the second occurrence of an unusual species in North America.

THE PHYSICAL SCIENCES—Emmett J. Cable, Robert W. Getchell, William H. Kadesch and Harry E. Crull—*Prentice-Hall*, 3rd ed., 496 p., illus., \$7.35. A basic background in the physical sciences for prospective teachers and those people interested in obtaining a general scientific knowledge.

THE PUZZLE OF FOOD AND PEOPLE: A Geography Reader—Amabel Williams-Ellis—*UNESCO*, 56 p., illus., paper, 60 cents. Beautifully illustrated supplementary text containing a jig-saw puzzle which can be cut out, mounted and fitted together, all pieces fitting except one marked war. Order direct from UNESCO, United Nations, New York, sending money with order.

THE RADIO AMATEUR'S LICENSE MANUAL—*American Radio Relay League*, 27th ed., 95 p., illus., paper, 50 cents. Gives the requirements for the various types of licenses and lists the regulations applicable to the "ham operator."

REMARKS ON AND DESCRIPTIONS OF SOUTH AMERICAN NON-MARINE SHELLS—Fritz Haas—*Chicago Natural History Museum*, 42 p., illus., paper, \$1.00. Short faunistic lists, critical remarks on imperfectly known species, and descriptions of novelties.

REPORT OF THE DIRECTOR TO THE BOARD OF TRUSTEES FOR THE YEAR 1950—*Chicago Natural History Museum*, 142 p., illus., paper, \$1.00.

REVIEW OF THE SUBSPECIES OF THE SUNBIRD, NECTARINIA JUGULARIS—Austin L. Rand—*Chicago Natural History Museum*, 10 p., paper, 20 cents. How you can tell where a sunbird comes from by its feathers.

Science News Letter, August 4, 1951

The female black widow spider is shining jet black on the upper surface of the body but on the underside has a red mark the shape of an hourglass.

PHYSICS

Visible Lightning Bolt Is Earth-to-Cloud Bound

➤ THE BRILLIANT flash of lightning seen by the human eye is traveling from the earth to a cloud, not from cloud to earth as generally thought.

That is one of the basic facts about lightning which General Electric scientists in Pittsfield, Mass., have used in conducting lightning research during the past 25 years. The flash seen by the eye, spurting from the earth to a cloud, travels at a rate of some 18,000 miles per second, according to Julius H. Hagenguth of the GE laboratory.

He explained that as a lightning charge is building up in the clouds, an opposite charge is building up on earth. The stroke travels slowly from the clouds, invisible to the eye. When it contacts the ground, the brilliant flash which is seen spurts from the ground toward the sky.

There is still much to learn about lightning although many questions have been solved by experimental work in the GE high-voltage laboratory where a 15,000,000-volt jolt of artificial lightning can be obtained with the flick of a switch. Included are some facts which are contrary to long-time beliefs.

Lightning often strikes twice in the same place, Mr. Hagenguth states. The Empire Building in New York City has been struck as many as 48 times in a single season. With the new 222-foot television antenna atop the 1,250-foot structure, more frequent strikes may be expected.

The lightning rod on a building does not ward away the negative bolt with positive charges from the earth. Actually, it intercepts the lightning and conveys it safely away to the ground, thus preventing its flow through vulnerable parts of the structure. The lightning rod is still the homeowner's best protection against the ravages of lightning, he stated.

Science News Letter, August 4, 1951

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✿ **TRIPLE-FACED DOLL**, a plastic affair with its head on a pivot, shows one face at a time, the other two being hidden behind curls and a bonnet. In general, all three are the same face, but one is smiling, one crying and the other sleeping. The doll has also a "double voice."

Science News Letter, August 4, 1951

✿ **HAND CHALK** for the seamstress is for drying the hands on a hot sticky day so that they will not cling to fabrics. It is a special formula in cake form, the size of the palm. When the hand is rubbed over it enough chalk comes off to dry the skin but not to soil the work.

Science News Letter, August 4, 1951

✿ **MEDICINE CABINET** for the bathroom, a built-in type with a mirror door, has a lower section of either one or two compartments with downward-opening shutters. When opened they form convenient shelves to hold shaving equipment and other bathroom accessories.

Science News Letter, August 4, 1951

✿ **FOUR-POWER MAGNIFIER**, for scientists and craftsmen, is a double lens type that gives enlargements without the slightest distortion. Its two-inch lenses are optically ground and polished, and are mounted so as to make them positively dust-proof.

Science News Letter, August 4, 1951

✿ **MICROFILMING MACHINE**, designed especially to make storage copies of radiographs, the X-ray pictures taken by doctors, is shown in the photograph. It is automatic in action and makes hundreds of precision



copies on a single roll of film. To use, the radiograph is placed on an illuminator surface and a button pushed.

Science News Letter, August 4, 1951

✿ **KITCHEN RANGE**, designed to be placed at one end of a counter between the kitchen proper and the dining alcove, has an oven that opens on the end, and convenient controls on both sides for the four burners on the top. Side windows in the oven permit easy viewing.

Science News Letter, August 4, 1951

✿ **TELEVISION GLASSES**, developed specially for relief of discomfort to the eyes in viewing television pictures, are coated with a special preparation which is permanent and as hard as the glass itself. These lenses can be easily finished in prescription shops.

Science News Letter, August 4, 1951

✿ **FOOTBALL SLED**, the device used in practice against whose upright padded portion the football line charges as a unit, is equipped with signals that indicate the operations of each individual player. These signals show which, if any, are lagging behind the others and by how much they are lagging.

Science News Letter, August 4, 1951

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Do You Know?

The so-called *ant lion* digs a pit in the sandy soil and waits at the bottom for other insects to fall in and become its prey.

Pigs with the disease known as infectious atrophic rhinitis sneeze frequently and their faces acquire a dished-in look.

A stripe-nose *bat* of Panama, *Uroderma bilobatum*, lives in a "bungalow" which it builds for itself with palm foliage.

The *azalea* is a choice shrub to plant in locations too shady for most flowering plants.

Refined wax-free liquid *shellac* is used to protect many fine paintings.